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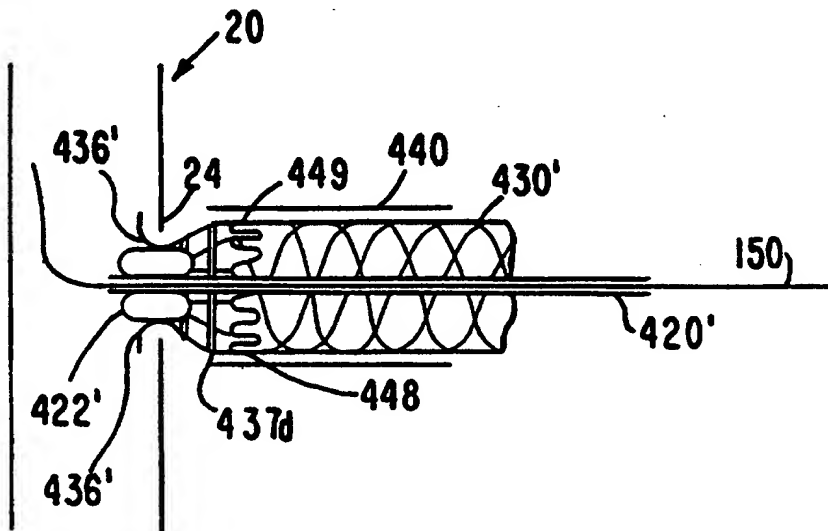
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A61F 2/06, A61B 17/32		A3	(11) International Publication Number: WO 98/19629
			(43) International Publication Date: 14 May 1998 (14.05.98)
(21) International Application Number: PCT/US97/19946 (22) International Filing Date: 5 November 1997 (05.11.97) (30) Priority Data: 08/745,618 7 November 1996 (07.11.96) US 08/839,199 23 April 1997 (23.04.97) US (71) Applicant: VASCULAR SCIENCE INC. [US/US]; Suite 202, 701 Decatur Avenue North, Minneapolis, MN 55427 (US). (72) Inventors: BACHINSKI, Thomas, J.; 19059 Orchard Trail, Lakeville, MN 55044 (US). GOLDSTEEN, David, S.; 4885 East Lake Harriet Parkway, Minneapolis, MN 55409 (US). SULLIVAN, Daniel, J.; 1245 Oak View Road, Medina, MN 55356 (US). (74) Agents: JACKSON, Robert, R. et al.; Fish & Neave, 1251 Avenue of the Americas, New York, NY 10020 (US).			(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 11 September 1998 (11.09.98)

(54) Title: MEDICAL GRAFTING CONNECTORS AND FASTENERS

(57) Abstract

A body tissue graft for use in a patient includes a frame structure made of a first elastic material, a covering of a second elastic material on the frame structure, the covering substantially filling openings in the frame structure, and a connector connected to the frame structure. Projections are secured to the connector structure. The projections facilitate attachment of the tubular graft in a patient by securing the graft to the body tissue with which the graft is employed. The connector selectively circumferentially expands and the projections selectively circumferentially expand. This may be done using an inflatable balloon to circumferentially expand the projections. A restraining member may be provided to restrain the projections in a cone shape so that an end of the graft may be used to open an aperture through a side wall of existing body organ tubing and a portion of the projections may enter the aperture.



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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 97/19946

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 A61F2/06 A61B17/32		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 6 A61F A61B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96 22745 A (SCHNEIDER USA INC ;INDIANA UNIVERSITY FOUNDATION (US); UNIV JOHNS) 1 August 1996	1-13, 19-21, 23,24, 27,28, 31,32, 34-36, 46-49, 58-61
A	see the whole document <div style="text-align: center;">--- -/--</div>	16,51, 62,130
<div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex. </div>		
° Special categories of cited documents :		
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>*Z* document member of the same patent family</p> </div> </div>		
Date of the actual completion of the international search <div style="text-align: center;">23 July 1998</div>		Date of mailing of the international search report <div style="text-align: center;">4 August 1998 (04.08.98)</div>
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer <div style="text-align: center;">Neumann, E</div>

INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 712 614 A (ADVANCED CARDIOVASCULAR SYSTEM) 22 May 1996 see the whole document ---	1-6, 8-13, 19-21, 28,29, 31-37, 58-61
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A	---	70-72, 97-100
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7 X	WO 93 20757 A (BAXTER INT) 28 October 1993 see page 9, line 15 - page 11, line 16; figures ---	120-125
2	---	-/--

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Intern 1al Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	---	126
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INTERNATIONAL SEARCH REPORT

International application No.
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Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 127-129
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-57,58-65

A graft having a frame structure with a covering and a connector fixed to the frame structure on both ends.

2. Claims: 66-119

A connector to be inserted inside into a graft and which is enlargeable to press the graft into body tissue.

3. Claims: 120-125

A graft having two spaced annular flange portions.

4. Claim : 126

An artificial graft having a first tubular portion and a second tubular portion which is transverse and in fluid communication with the first tubular portion.

5. Claims: 130-142

An apparatus to extend a graft having struts on its outer ends in a cone-shaped arrangement.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/19946

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